

Final Report

Submitted to:
Air Force Office of Scientific Research
801 N. Randolph Street, Room 732
Arlington, VA 22203-1977

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- ✓ 1) Date submitted: MAY 16, 2000
- 2) Title: DURIP 98-99 OPTICAL FIBER GRATINGS USING UV LIGHT
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- 4) Time period covered: March 1, 1998 - August 31, 1999
- 5) Institution Name: UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CALIFORNIA
90089-0484
- 6) Federal agency identifying award number: F49620-98-1-0270
- 7) Special circumstances regarding equipment acquisition: None

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FINAL REPORT

F49620-98-1-0270

DURIP 98-99 OPTICAL FIBER GRATINGS USING UV LIGHT

This is an "equipment only" grant under the Defense University Research Instrumentation Program. A report of the results obtained with this equipment is contained in the reports for Grant F49620-98-1-0051, "OPTICAL FIBER GRATINGS USING NEAR-UV LIGHT." To avoid duplication of paperwork, only a partial summary of those report will be duplicated here. This grant is to investigate the physical properties of gratings written in optical fibers using ultraviolet light. The equipment purchased in this grant includes:

Equipment Description	Expense
Lexel - Argon Laser	\$41,135
Bruker - EPR Spectrometer System Upgrade	\$8,874
Newport Corporation - precision long-travel stage	\$12,413
Deltronic Crystal Industries - crystals	\$5,424
Computer System for motion controllers	\$14,749
Integrated Photonic Systems - motion controller system	\$5,461
Coherent - UV laser tube	\$33,449
Vytran Corporation - fusion splicer and fiber strength tester	\$38,150

Key accomplishments using the above equipment are:

- 1) We performed experiments to reveal how light alters the refractive index of germanium-doped optical fibers. We found that loading the fiber with hydrogen turns on a separate physical mechanism so that all of the Ge atoms become photosensitive, instead of only the Ge defects.
- 2) We perfected methods of writing long-period gratings in fibers with no unwanted harmonics or sidelobes.
- 3) We fabricated a large number of fiber gratings in germanium-doped fibers and supplied these gratings to other research groups for demonstration of systems applications. These include using fiber gratings as adjustable dispersion compensators and as adjustable delay elements in a fiberoptic network.
- 4) We performed and presented new results on the strength of gratings written through the polymer coating of optical fibers.
- 5) We invented a new type of fiber sensor that needs no spectrometer and that works in real time. It senses either temperature or strain.

REPORT DOCUMENTATION PAGE

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